

importance. It is not too much to say that when the author is unable to copy from a clear-headed and accurate writer, such as von Sonklar, this part of his work is frequently a mere muddle.

In attempting to subdivide the Alps into separate groups it is possible to apply one or other of two guiding principles. You may look either to the configuration of the surface and make the deep valleys and low passes that occur here and there throughout the chain the boundaries between the different groups, or you may attend mainly to geological structure, and form groups in each of which a central mass of crystalline rock is surrounded by a girdle of sedimentary strata, but in so doing must often disregard the actual features of the country. M. Pfaff has alternately adopted the geological grouping of Studer and the orographic arrangement of von Sonklar, with the natural result that the same mountains and valleys are in some cases included in two different groups while others are left utterly unprovided for, there being no one group in which they can be placed. For some groups the author has attempted to assign limits and specify the higher summits, but considering the ill success of these attempts, he has, perhaps wisely, refrained in other cases, and for eleven groups he has given names without attempting to define their limits. Among the dominant peaks we find the two ancient impostors Mont Ollan and Mont Iséran, whose existence has long since been disproved by the active members of our Alpine Club, and, stranger still, we are told to look for the latter in an utterly new direction—in the range west of the Col de Bonhomme “between the Isère and the Rhone”—where the discovery of a mountain over 13,000 feet high would undoubtedly make a lively sensation among the natives. A list of the most important peaks in the Alps is given, in which are enumerated fourteen summits in the mass of Mont Blanc, and twelve of those of Monte Rosa, while the crowning peaks of other important groups such as the Grand Paradis and Piz Bernina, each well above 13,000 feet, are altogether omitted. Heights copied at random from various authorities are hopelessly irreconcilable. In one page the Gross Glockner is 495 English feet higher than the Ortler Spitz; a few pages later the tables are turned, and the Ortler surpasses his rival by 285 feet. What with errors in the spelling of names, confusion of standards—Paris feet being quoted in one line, Vienna feet in the next, and in the third some other foot differing from both—and arithmetical blunders or misprints, this portion of the book is simply bewildering.

Under the head of meteorology the author discusses at much length the laws connecting the decrease of temperature of the air with increasing elevation above the earth's surface. He gives the now-antiquated formula of S. von Waltershausen as in accordance with observation, and then professes to give the results of what, with characteristic accuracy, he describes as the “observations of Glaisher and Coxwell, who, on September 5, 1862, in London, rose to the astonishing height of 26,800 feet” (28,565 English feet). The reader who may turn to the report of Messrs. Glaisher and Coxwell's famous ascent from Wolverhampton will fail to find anything in the least resembling the results here given, these being in truth very incorrectly calculated from the average results of all the ascents made in 1862.

No reference is made to the bearing of these or other recent investigations on a matter so interesting to Alpine travellers as the measurement of heights by means of the barometer, nor does Prof. Pfaff seem to be acquainted with the various memoirs by Count St. Robert, of Turin, wherein the whole subject is discussed in a masterly manner.

Fully one-third of the volume is devoted to the glaciers wherever it would appear that the writer has made observations on his own account. In this branch of his subject he is moderately well informed, and no doubt has done his best to steer cautiously through the rocks and shoals of personal controversy with which the history of this department of scientific inquiry is unfortunately surrounded, while at the same time he fails to mark accurately the positive contributions of each inquirer to the present sum of our knowledge.

He gravely discusses the dilatation theory of glacier motion, and comes to the conclusion that “dilatation cannot be considered the only cause of the progressive motion of glaciers,” and soon after remarks that the gravitation theory has now a majority of adherents; while it would be difficult to name a single competent authority who during the last twenty years has admitted that dilatation has any share whatever in producing the phenomena. He has doubtless read the writings of Agassiz, and Forbes, and Tyndall, but he shows himself unable to grasp the full force of the reasoning of the two latter writers, and in more than one instance has failed to understand them. With regard to the vexed question of the origin of the veined structure of glacier ice, Prof. Pfaff is especially unsatisfactory. He attributes the first notice of it to M. Guyot, though many previous travellers had like him observed it, but failed to discern, as Forbes first did, its significance and importance; and he further on confounds the *dirt bands* of Forbes with the superficial appearance of the veined structure. Especially imperfect and indefinite is the version here given of Tyndall's explanation of the origin of this structure; no reader would be likely to appreciate from these pages either the cogency of the arguments in favour of that explanation, or the difficulties which yet remain to be completely removed.

To those who are used to look for accurate knowledge and scrupulous care in German scientific works, it is disappointing to find that volumes designed for popular instruction in that country should be so deficient in all the requisites for imparting knowledge to unscientific readers, as this and some others which have lately appeared.

#### OUR BOOK SHELF

*Kryptogamen Flora von Schlesien.* Erster Band. (Breslau: J. U. Kern's Verlag, 1876.)

THIS flora is dedicated to the president of the “Schlesischen Gesellschaft für vaterländische Cultur,” Prof. Goeppert, on the fiftieth anniversary of his receiving his doctor's degree. The whole has been ably edited by Dr. Ferdinand Cohn. It is proposed to continue the flora in two more volumes, one devoted to the Algæ and Lichens, and the third to the Fungi, but two years more must elapse before the completion of the entire work. The first volume includes two parts, the first containing the Vascular Cryptogams and Mosses, the second

the Liverworts and Characeæ, with an appendix to the species of Mosses and Hepaticæ, and a copious index. The vascular cryptogams are described by Stenzel, and include twenty-one genera, fifty-three species, and ten sub-species. A history of the discovery of Silesian Pteridophyta is prefixed, and an interesting account of their distribution. Thus the species found on serpentine, limestone, and other rocks, are noted, as well as the hypsometrical distribution. Four regions of elevation are distinguished: 1, from 55 metres to 150 m.; 2, from 150 m. to 500 m.; 3, from 500 m. to 1,100 m.; and 4, from 1,100 m. to 1,500 m. The arrangement of some of the species and sub-species is not quite in accordance with our English ideas. Thus *Woodisia hyperborea*, Koch, is separated into two sub-species: 1, *arvonica*, With.; and 2, *rufidula*, Sw.; equal to *hyperborea* R., Br. and *ilvensis* R., Br. respectively. *Cystopteris montana* of British botanists is *C. sudetica*, Al. Braun and Milde. Then *A. dilatatum*, *spinulosum*, and *cristatum*, are all placed as sub-species of *Aspidium spinulosum*, Sw., and *A. aculeatum lobatum*, and *angulare* are made sub-species of *A. aculeatum*, Döll.

The Mosses and Liverworts are described by Limpricht, and occupy the greater part of the volume, there being 106 genera and 464 species of Mosses, and 39 genera and 132 species of Hepaticæ. A few additional species are added in the Appendix, bringing up the Mosses to 492 species and the Liverworts to 155. The same arrangement is here followed as to history and distribution as in the case of the vascular cryptogams. The descriptions seem excellent, and the information given very full and complete, the characters of the orders and families being given in great detail.

The Characeæ have been described by Prof. Alexander Braun. Probably this was one of the last important works from his prolific pen. All must deplore his recent loss. His vast knowledge, the importance of his contributions to botany, and his genial kindly manner, the readiness he always showed in assisting his students, are well known. To know him was to love him, and we esteem it a high privilege to have been one of his students. The Characeæ are not very numerous, three genera and fourteen species being enumerated; but in the hands of Prof. Braun it becomes a most valuable memoir on the whole group, while the species likely to be found in Silesia are all pointed out. The synonymy must be very confused, as Braun notices that *Chara flexilis*, Waller, includes three or four species of *Nitella*, three of *Tolyphella*, and one *Chara*, *C. gracilis* of Sprengel is a still greater monster, as it includes five species of *Nitella*, one *Lychnothamnus*, and three species of *Chara*.

W. R. McNAB

*The Countries of the World, being a Popular Description of the Various Continents, Islands, Rivers, Seas, and Peoples of the Globe.* By Robert Brown, M.A., Ph.D., &c. Vol. I. (London: Cassell, Petter, and Galpin. No date.)

THIS is certainly an attractive book; the wealth of illustrations renders it so. While we recognise some of the illustrations as having done service elsewhere, many of them are new, well-executed, and afford a good idea of the scenery, products, and people of the regions they are meant to illustrate. This volume treats of the Arctic regions and North America, contains a great amount of miscellaneous information, and is written in a rambling easy-going style. It is essentially a popular work, but might have been made valuable even to the geographical student had some of the pictures been dispensed with and a number of regional maps substituted similar to those which are so important a feature in Reclus' "Géographie Universelle," with which masterly and exhaustive work, however, it would be unfair to compare it. We have no doubt Dr. Brown's work will afford pleasure and prove instructive to many readers.

## LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

### The Radiometer and its Lessons

HAVING been prevented from attending the recent meeting of the British Association by the necessity of devoting my entire vacation to mental and bodily renovation after the sad family losses I had sustained, I have only become aware within the last few days that my article in the April number of the *Nineteenth Century*, entitled "The Radiometer and its Lessons," had been there spoken of by Prof. G. Carey Foster, in his address as President of Section A, as showing an "unmistakable tendency, either intentionally or unintentionally, to depreciate Mr. Crookes's merits, and to make it appear that he had put a wrong interpretation upon his own results," which statement is said by your reporter to have "elicited great applause."

Of Mr. Crookes's own reply in the July number of the same periodical, entitled "More Lessons from the Radiometer," I took no notice; partly because my mind was at the time fully occupied by sad cares and urgent duties, and partly because I thought that his assertions (1) that he had not theorised on the subject at all, (2) that he had not attributed the rotation of the radiometer to the direct impetus of light, and (3) that he had never claimed the discovery of a new force or a new mode of force, were so well known in the scientific world to be inconsistent with fact, that I need not trouble myself to refute them.

Prof. Carey Foster, however, speaking with authority as President of the Physical section of the British Association, has given it as his judicial opinion that what I have written on this subject shows an unmistakable tendency to depreciate Mr. Crookes's merits, and to misrepresent his opinions; and he has further "unmistakably" suggested (as it appears to me) that this may have been done with deliberate intention, instead of being done in good faith under the influence of an unintentional bias. As it is impossible for me to allow such an imputation from such a quarter to pass unnoticed, I might fairly challenge Prof. Carey Foster to justify language which I must presume him to have used with all due consideration of its obvious meaning, and of his and my relative positions. But as he explicitly disavows the more serious part of this imputation, I have now only to ask to be allowed to show, in the columns of the journal which has not only recorded the accusation, but has pointedly directed attention to it,—first, that I have not, *even unintentionally*, "depreciated Mr. Crookes's merits" as the inventor of the Radiometer; and secondly, that Mr. Crookes really did in the first instance put that "wrong interpretation upon his own results" which I attributed to him. Had Prof. Carey Foster complied with the request I privately made him, that he should specify the passages which (in his opinion) justify his charge, I should have been able to reply to it much more briefly. But by declining thus to particularise, he obliges me to traverse the whole ground covered by his general accusation.

That I was not influenced, when writing on the Radiometer, by any *animus* arising from my personal antagonism to Mr. Crookes on another subject, will appear, I think, from the following extracts from the two lectures which I delivered at the London Institution (by special request) on Mesmerism, Spiritualism, &c., before Christmas, and which were published in *Fraser's Magazine* at the commencement of the present year:—

"The recent history of Mr. Crookes's most admirable invention, the Radiometer, is pregnant with lessons on this point. When this was first exhibited to the admiring gaze of the large body of scientific men assembled at the *soirée* of the Royal Society, there was probably no one who was not ready to believe with its inventor that the driving-round of its vanes was effected by the direct mechanical aid of that mode of Radiant Force which we call Light; and the eminent Physicists in whose judgment the greatest confidence was placed, seemed to have no doubt that this mechanical agency was something outside Optics properly so called, and was, in fact, if not a new Force in nature, a new *modus operandi* of a force previously known under another form. There was here, then, a perfect readiness to admit a novelty